CLAIMS

1. A method for separating a target substance from a mixture using a first solvent and a second solvent wherein the first solvent and the second solvent undergo a reversible phase change from a biphasically separated state into a mutually dissolved monophasic state by means of changing the temperature, wherein an upstream region and an intermediate region of a column containing the first solvent are kept within a range of the temperature allowing for a monophasic mutual dissolution and a downstream region of the column is kept within a range of the temperature allowing for a biphasic separation, wherein the second solvent containing the mixture dissolved therein is loaded onto the column from the upstream of the column and thereafter the second solvent phase separated in the downstream region of the column is taken out whereby separating the target substance.

2. The method according to Claim 1 wherein the upper region of the column is kept within a range of the temperature allowing for a biphasic separation.

3. A method for separating a target substance from a mixture using a first solvent and a second solvent wherein the first solvent and the second solvent undergo a reversible phase change from a biphasically separated

state into a mutually dissolved monophasic state by means of elevating the temperature, wherein an upstream region and an intermediate region of a column containing the first solvent are kept at a temperature lower by 5°C than the mutual dissolution temperature or above and a downstream region of the column is kept below a temperature lower by 5°C than the mutual dissolution temperature, wherein the second solvent containing the mixture dissolved therein is loaded onto the column from the upstream of the column and thereafter the second solvent phase separated in the downstream region of the column is taken out whereby separating the target substance.

4. The method according to Claim 3 wherein the upper region of the column is kept below a temperature lower by 5°C than the mutual dissolution temperature.

5. A method for separating a target substance from a mixture using a first solvent and a second solvent wherein the first solvent and the second solvent undergo a reversible phase change from a biphasically separated state into a mutually dissolved monophasic state by means of lowering the temperature, wherein an upstream region and an intermediate region of a column containing the first solvent are kept at a temperature higher by 5°C than the mutual dissolution temperature or below and a

downstream region of the column is kept above a temperature higher by 5°C than the mutual dissolution temperature, wherein the second solvent containing the mixture dissolved therein is loaded onto the column from the upstream of the column and thereafter the second solvent phase separated in the downstream region of the column is taken out whereby separating the target substance.

6. The method according to Claim 5 wherein the upper region of the column is kept above a temperature higher by 5°C than the mutual dissolution temperature.

7. The method according to Claim 1 wherein, after the second solvent containing the mixture dissolved therein is loaded onto the column from the upstream of the column, the first solvent and the second solvent undergo an mutual dissolution in the intermediate region of the column to become monophasic.

8. The method according to Claim 1 wherein a separation promoting substance is dissolved or dispersed in the first solvent.

9. The method according to Claim 8 wherein the separation promoting substance is a chiral molecule and/or an alkyl or alkenylamine.

10. The method according to Claim 9 wherein the chiral molecule is an amino acid derivative and/or a saccharide

derivative.

11. The method according to Claim 9 wherein the alkylamine is octadecylamine.

12. The method according to Claim 1 wherein a plural of columns are employed in tandem.

13. The method according to Claim 1 wherein the first solvent is a less polar solvent.

14. The method according to Claim 13 wherein the less polar solvent is at least one selected from the group consisting of a saturated hydrocarbon, a cyclic saturated hydrocarbon, an unsaturated hydrocarbon, a cyclic unsaturated hydrocarbon, an aromatic compound, a linear or cyclic saturated or unsaturated group-carrying compound.

15. The method according to Claim 1 wherein the first solvent is at least one selected from the group consisting of cyclohexane, methylcyclohexane and decaline.

16. The method according to Claim 1 wherein the second solvent is a highly polar solvent.

17. The method according to Claim 1 wherein the highly polar solvent is at least one selected from the group consisting of water, a nitroalkane, a nitrile, an alcohol, a halogenated alkyl, an amide compound, an imidazolidinone compound, a carbonate, an ether, an urea, a carbamate, a carbodiimide, an ester, a carboxylic acid, an aldehyde, ketone and sulfoxide.

18. The method according to Claim 1 wherein the second solvent is at least one selected from the group consisting of dimethylimidazolidinone, dimethylformamide and dimethylacetamide.

19. The method according to Claim 1 wherein, after the second solvent containing the mixture dissolved therein is loaded onto the column from the upstream of the column, the second solvent having no mixture dissolved therein is loaded onto the column from the upstream of the column.

20. The method according to Claim 19 wherein the second solvent having no mixture dissolved therein is saturated by the first solvent.

21. The method according to Claim 19 wherein the temperature of the second solvent having no mixture dissolved therein is adjusted preliminarily so that it is equal to the temperature in the upstream of the column.

22. A device for separating a target substance from a mixture using a first solvent and a second solvent, wherein the first solvent and the second solvent undergo a reversible phase change from a biphasically separated state into a mutually dissolved monophasic state by means of changing the temperature, said device comprising:

a column containing the first solvent;

a first temperature controller which controls the temperature in an upstream region and an intermediate

region of said column;

a second temperature controller which controls the temperature in a downstream region of said column;

a loading port via which the second solvent containing the mixture dissolved therein is introduced from the upstream region of the column; and,

a sampling port via which the second solvent phase after a biphasic separation in the downstream region of the column is taken out.

23. The device according to Claim 22 further comprising a pump port which pumps the second solvent to the upstream region of the column.

24. The separation device having a plural of the devices according to Claim 22 in tandem.

25. The device according to Claim 22 having a first temperature controller in the intermediate region of the column and a third temperature controller in the upstream region of the column instead of the first temperature controller which controls the temperature in an upstream region and an intermediate region of said column.

26. A method for regenerating a column in a device according to Claim 25 wherein the third temperature controller is set within a range of the temperature enabling a biphasic separation and wherein the second solvent is allowed to undergo a counter-flow from the

sampling port for taking the second solvent phase out and wherein the first solvent phase is taken out from the upstream region of the column.